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ELEVATING FISHERS OF DAL LAKE IN JAMMU AND KASHMIR

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ABSTRACT

The deteriorating condition of one of the most magnificent lakes of India, the Dal Lake, has provoked a lot of research interest from the biological and ecological points of view. However, the impact of deterioration of the ecology on the inhabitant fisherfolk around Dal Lake has not been given much importance. In this study, the three major beats of the lake, namely, Hazratbal, Nishat and Nehru Park, were surveyed, randomly taking 10% of the fishermen families. It was observed that the summer mean catch per day (5.18 ± 0.69 kg) was more than the mean winter catch per day (2.85 ± 0.40 kg). However, the total annual catch per person was only 1195.56 ± 211.63 kg. Moreover, marketing through middlemen, especially, during summer, was observed to be very low fetching in terms of mean price per kilogramme fish, amounting to Rs 37.50 ± 2.54 for local fish and Rs 22.50 ± 2.88 for the carp. It was also observed that the fisherfolk had borrowed a good amount of money for the repair and construction of their houses and boats. Therefore, on the whole, the fishing business around Dal Lake was observed to be under severe stress. In this context, this paper has come out with recommendations to uplift the socio-economic conditions of the fishers.

Key words: Dal Lake, socio-economics, fisherfolk

INTRODUCTION

Dal Lake has been considered to have originated from the progressive shrinkage of the ancient glacial lake (Dianella, 1922). However, de Terra and Paterson (1939), considered the lake to have been derived from oxbows and abandoned flood channels of River Jehlum. As many as 17 species of fish (Das and Subla, 1963; Jayaram, 1974), 106 species of macrophytes belonging to 30 families (Kaul and Zutshi, 1967), 72 species of zooplankton (Yousuf and Parveen, 1989) and 139 taxa of phytoplankters (Kundangar, 1994) have been reported from the lake. Large peripheral areas have been reclaimed and converted into floating gardens. Large quantities of raw sewage are discharged into it resulting in the eutrophication of the lake and consequently, the excessive growth of macrophytes. Kaul *et al.* (1978) reported that the floating macrophytes occupied about 29.2% of the total area of the lake, while the submerged hydrophytes covered about 55-65% of the lake area. About 18 genera and 27 species

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of potentially hazardous bacteria including those causing typhoid and cholera have been recorded from its waters (Kaul, 1988). The deterioration of the lake water has shown a profound effect on the ichthyofauna of the lake, registering a sharp decline in the fish catches to the extent of 25-35% (Shyam Sunder *et al.*, 1978). The introduction of common carp (*Cyprinus carpio*) has also severely affected the indigenous schizothoracid population of the lake (Saxena and Koul, 1966; Subla, 1967; Qureshi *et al.*, 1971). As much as 65% of the present day fish catches from the lake comprises of common carp, whereas, the endemic schizothoracids contribute only about 20% (Shyam Sunder, 1995). Several proposals have been made in the past to improve the conditions of the lake. Notable among these are, the Srinagar Master Plan of 1971, the Lake Area Master Plan, the Enex Consortium Report (Enex, 1978), the UNESCO Mission Report on Environmental Degradation in Kashmir and the Dal Lake Development Report in Vale of Kashmir (Riddle, 1983).

There are about 650 active fishermen residing in a number of hamlets strewn along the periphery of the lake. They make their living mainly by fishing. The technological innovations in the fisheries sector have not shown much impact on the living conditions of the fishers of Dal Lake. They are, by and large, still socially and economically very backward. The importance of Dal Lake from fisheries point of view made the authors select it for the present study with the objective to study the socio-economic profile of the fisherfolks thriving on Dal Lake, the relationship between the socio-economic variables and catch in the lake, and the linkage between the stake holders of the lake in general and fisheries in specific.

METHODOLOGY

The Department of Fisheries, Government of Jammu and Kashmir, for the purpose of administration has divided the Dal Lake into three major beats, namely, Hazratbal, Nishat and Nehru Park. These beats comprise a number of hamlets, where the fishermen reside. The Hazratbal Beat has 135, the Nishat Beat 158 fishermen and the Nehru Park Beat 350 licensed fishermen. From each of these beats, 10% of the fishermen were randomly selected and interviewed. Thus, in Hazratbal Beat, 14 fishermen, in Nishat Beat 16 fishermen and in Nehru Park Beat, 35 fishermen were interviewed. In total, the 65 fishermen families that were interviewed comprised 122 males, 108 females and 178 children. The selection of the fishermen was done by simple random sampling method. A schedule was used for conducting the survey. The responses of the respondents were recorded on the schedule. Data collected from the respondents were tabulated for statistical analysis.

RESULTS AND DISCUSSION

Socio-economic profile of the respondents

The socio-economic profile of a community plays a very important role in its welfare. This holds good for the fisheries sector also. The socio-economic parameters

like age, education, family size, family type, occupation, income and experience have a profound effect on the living standards of fishermen. A study of these parameters is not only essential to pinpoint the factors that may be constraining the realization of their full potential, but also may help the governmental organizations in developing measures to fill up such lacunae and loopholes.

The younger fishermen (16-37 yr) were more involved in fishing (55.74%) as the trade involved a lot of handwork. All the respondents were Muslims belonging either to the Sunni (55.38%) or the Shia (44.62%) sects. People belonging to Shia sect also have subsidiary occupations like carpet weaving, manufacturing grass mats, cultivation of vegetables, etc., whereas, the respondents belonging to the Sunni sect seldom have subsidiary occupations.

About 54% of the respondents were literate (Table 1). However, a majority of the respondents (91%) attended school till they reached the middle school level, *i.e.,* till the time they attained the age of 15 to 16 years. The respondents then dropped out of school to take up fishing or other occupations. The literacy rate of 54.10% is below the literacy rate for males of the state, which is 65.75% (DOC, 2001). Over two-thirds of the families surveyed were nuclear families, while only 30.77% families were joint ones. However, the majority (81.54%) of the families surveyed were big families (> 4 members), while only 18.46% were small families. Out of the 122 male respondents from 65 families surveyed, the majority (70.50%) practiced fishing as their main occupation. This was followed by respondents working as manual labourers (9.84%), carpet weavers (7.38%), tailors (4.10%) and drivers (1.64%). About 4% of the respondents had no job. It was also revealed that 54.10% of the respondents had no subsidiary occupation and lived entirely on their main occupations. However, 43.44% of the respondents cultivated vegetables as the subsidiary occupation. Other subsidiary occupations were manual labour (1.64%) and carpet weaving (0.82%). The majority (39.34%) of the respondents were earning between Rs 38,400 and 54,600 per annum. About one-fourth of the respondents were earning between Rs 6,000 and 22,200 annually, while 28.69% of the respondents had an average annual income of Rs 22,200 to 38,400. About 6.56% of the respondents had no income as they were not having any job. The biggest category (41.54%) of the respondents had medium level of experience, *i.e.,* 24-44 years in fishing, 35.38% had low level of experience (2-23 yr) and 23.08% had high level of experience (45-65 yr).

An overwhelming majority (76.92%) of the respondents had taken credit from one or the other source. Out of the 50 respondents who had taken credit, 48% had taken it from relatives, followed by 22% who had taken money from the middlemen; 18% had borrowed money from their friends and 12% from banks. The high percentage of respondents taking money from their relatives and friends was due to the fact that no interest is levied on the amount. Since, the banks charge a high rate of interest ranging from 14 to 18%, and the procedure is also very cumbersome and time consuming, the percentage of respondents taking bank loans was very low. The high percentage of

Table 1: Socio-economic profile of the respondents

Age			**N=122**
S. No.	Category	Frequency	Percentage
1.	Young age (16-37 years)	68	55.74
2.	Middle age (38-59 years)	34	27.87
3.	Old age (60-81 years)	20	16.39
Sect			**N = 65**
1.	Sunni	36	55.38
2.	Shia	29	44.62
Educational status			**N = 122**
1.	Illiterate	56	45.90
2.	Up to lower primary school	28	22.95
3.	Lower primary to upper primary school	10	8.20
4.	Upper primary to middle school	17	13.93
5.	Middle school to high school	8	6.56
6.	High school to higher secondary school	3	2.46
Family type			**N = 65**
1.	Nuclear	45	69.23
2.	Joint	20	30.77
Family size			**N = 65**
1.	Small family (4 members and below)	12	18.46
2.	Big family (5 members and above)	53	81.54
Main occupation			**N = 122**
1.	Fishing	86	70.50
2.	Labour	12	9.84
3.	Carpet weaving	9	7.38
4.	Tailoring	5	4.10
5.	Driving	2	1.64
6.	Pashmina yarn spinning	1	0.82
7.	Electrification	1	0.82
8.	Sales	1	0.82
9.	No job	5	4.10

Subsidiary occupation			**N = 122**
1.	Vegetable growing	53	43.44
2.	Manual labour	2	1.64
3.	Carpet weaving	1	0.82
4.	None	66	54.10

Average annual income			**N = 122**
1.	Low income (Rs 6,000 - 22,200)	31	25.41
2.	Medium income (Rs 22,200 - 38,400)	35	28.69
3.	High income (Rs 38,400 - 54,600)	48	39.34
4.	No income	8	6.56

Experience			**N = 65**
1.	Low (2-23 yr)	23	35.38
2.	Medium (24-44 yr)	27	41.54
3.	High (45-65 yr)	15	23.08

Source of credit			**N = 50**
1.	Friends	9	18.00
2.	Relatives	24	48.00
3.	Banks	6	12.00
4.	Middlemen	11	22.00

Amount taken on credit			**N = 50**
1.	Rs 5,000 – 37,000	38	76.00
2.	Rs 37,001 – 69,000	6	12.00
3.	Rs 69,001 – 101,000	6	12.00

Purpose of credit			**N = 50**
1.	Repair/construction of house or boat	30	60.00
2.	Marriage of kin	12	24.00
3.	Treatment of illness	5	10.00
4.	Household needs	2	4.00
5.	Purchase of cow	1	2.00

fishermen in debt was because of the fact that their income is very low. The problem becomes graver during winter months when, on one hand, the catch is reduced by almost 40-45%, while on the other hand, the expenditure increases. A vast majority of respondents (76%) had borrowed money in the range of Rs 5,000 - 37,000, followed by 12% who had taken credit to the tune of Rs 37,001 - 69,000, while another 12% had taken credit in the range of Rs 69,001 - 101,000. An overwhelming majority (60%) of the respondents had taken loan for the repair/construction of boat or house. This was followed by 24% of the respondents who had contracted debt on marriages of their kin. The percentages of respondents who had taken credit for treatment of illness, household needs and purchase of cow were 10, 4and 2%, respectively.

Mass media exposure of the respondents with respect to reading newspapers was very poor. A vast majority (73.85%) of respondents had no habit of reading newspapers and just 26.15% read newspapers. A vast majority (89.23%) of the respondents never read magazines. An overwhelming majority (90.76%) of respondents listened to radio. However, the respondents mostly listened to radio for entertainment like songs, plays, etc. The majority (63.08%) of the respondents watched television. The high percentage of fishermen listening to radio and watching television can be efficiently educated by airing programmes on fish processing, product development, improvement in lake environs, marketing, artificial stocking, etc., which will ultimately benefit the fishermen community of the lake. Programmes envisaging creation of a general awareness in the public, especially in the people living within and around Dal Lake, about the repercussions of the unchecked pollution of the lake and those of the increasing encroachments within and around it, can result in improving the lake as well as its fishery.

Catch

Table 2 reveals that the mean catch per day per fisherman in summer (April-September) was about 5.18 ± 0.69 kg, whereas, in winter (October-March) the mean catch per day per fisherman was about 2.85 ± 0.40 kg. The average fishing days during the summer months were 25.29 ± 1.88, whereas, in winter, the average fishing days per month were 23.80 ± 3.55. The average fishing days in winter were less than those in summer due to the severe cold in the valley. The table reveals that

Table 2: Fish catch of sample fishermen

S. No.	Category	Season	Mean	S.D.
1.	Average catch (kg/d)	Summer	5.18	0.69
		Winter	2.85	0.40
2.	Average fishing days per month	Summer	25.29	1.88
		Winter	23.80	3.55
3.	Total catch (kg/mo)	Summer	131.38	21.98
		Winter	68.68	15.92
4.	Total catch (kg/yr)	-	1195.56	211.63

the total catch per month per fisherman in summer was 131.38 ± 21.98 kg, whereas, in winter, it was 68.68 ± 15.92 kg. The total catch per fisherman per annum was 1195.56 ± 211.63 kg.

Relationship between catch and personal variables:

A perusal of Table 3 reveals that there is a negative and significant correlation between age and annual fish catch. Hence, it can be concluded that younger fishermen had higher fish catch per annum than the older fishermen. This revelation is also in conformity with the general observation that the amount of work a person can do decreases as he approaches old age. The average fishing days per month were also observed to be more in the case of younger respondents than the older ones. There is a positive and significant relationship between education and annual fish catch. It indicates that respondents with higher educational status get higher fish catch. This may be due to the fact that the educational status was higher in younger respondents than the older ones and it has already been established that the younger respondents had higher annual fish catch than the older respondents. The relationship between experience and fish catch is negative and significant. It indicates that fish catch decreased as the experience of a respondent increased. This is also a manifestation of the fact that younger respondents had higher fish catch per annum than the older respondents, as less experienced fishermen meant young fishermen and more experienced fishermen meant older ones.

Marketing of fish

Table 4 reveals that a majority (56.92%) of the respondents sold the fish directly to the consumers, while 43.08% of the respondents sold the fish to the middlemen. It can be observed from Table 5 that for the respondents who sold the fish directly to the consumers, the average selling price per kilogramme for local fish in summer was Rs 47.97 ± 3.81, while for carp it was Rs 28.92 ± 3.14. The average selling price

Table 3: Relationship between catch and personal variables

S. No.	Variable	'r' value
1.	Age of fishermen versus fish catch	-0.709*
2.	Education of fishermen versus fish catch	0.418*
3.	Experience of fishermen versus fish catch	-0.691*

Table 4: Marketing of fish **N = 65**

S. No.	Category	Frequency	Percentage
1.	Self	37	56.92
2.	Middleman	28	43.08
	Total	65	100.00

per kilogramme for local fish in winter was higher, *i.e.*, Rs 67.43 ± 3.65, while for carp it was Rs 49.59 ± 3.79.

The rates were lower for the respondents who sold the fish to the middlemen. As can be observed from Table 5, the average selling price per kilogramme for indigenous fish in summer was Rs 37.50 ± 2.54, while for carp, it was Rs 22.50 ± 2.88. The average selling price per kilogramme for local fish in winter was Rs 47.32 ± 2.53, while for carp, it was Rs 34.64 ± 4.06. It indicates that the respondents who sold the fish themselves got a better price than those who sold the fish to the middlemen. Another interesting finding is that the selling price of the fish was higher in winter than in summer and also the indigenous fish (*Schizothorax* spp.) were priced higher than the carp. This is in consonance with the fact that consumption of fish in Kashmir is more and the catch is less in winter than in summer, and it also shows that the local population prefers the indigenous fish to carp.

An analysis of Table 5 reveals that fishermen who sold the fish themselves got 20-30% more price than the fishermen who sold their fish to the middlemen. The study revealed that fishermen who owed money to the middlemen got even lesser price. This malpractice by the middlemen can be stopped by constituting a development board for the fishermen on the lines of the National Dairy Development Board that shall purchase fish from fishermen at a fair price. The income generated by the board can even be utilized for product development (like fish papads, fish pickles, etc.), fish processing, artificial stocking and eco-restoration of the lake.

Linkage between the stake holders of the lake in general and fisheries in specific

One of the most effective ways to improve the conditions of the fisherfolk of Dal Lake could be by forming a cooperative society of the fisherfolk. The society shall have an implementing body and an advisory board. The implementing body, headed by

Table 5: Average selling price per (Rs/kg) of fish in winter and summer

S. No.	Category	Season	Species	Mean price	S.D.
1.	Self	Summer	Local	47.97	3.81
			Carp	28.92	3.14
		Winter	Local	67.43	3.65
			Carp	49.59	3.79
2.	Middleman	Summer	Local	37.50	2.54
			Carp	22.50	2.88
		Winter	Local	47.32	2.53
			Carp	34.64	4.06

a chairman and a secretary and comprising all the fisherfolk of the lake as its members, shall be responsible for implementing various ways and measures to improve the lake as well as its fishery with an ulterior motive of improving the socio-economic conditions of the fisherfolk. The advisory board, on the other hand, shall be a planning body with members from various government departments associated with the lake, like Lakes and Waterways Development Authority, Fisheries Department, Tourism Department, Forest Department, Housing and Urban Development Department, Urban Environmental Engineering Department and Srinagar Municipality.

The District Development Commissioner shall be the Chairman of the advisory board. The function of the board shall be to give expert advice to the implementing body on various matters related to the lake and its fisherfolk. For realization of revenue, the society can take up activities like marketing of fish, processing and product development. The income or revenue generated by the society shall be utilized for improving the conditions of the lake, its fishery and the fisherfolk. Measures like artificial stocking of the lake, improvement of its water quality and reforestation of the catchment areas can go a long way in improving the fishery of the lake and ultimately, the living conditions of the labour force dependent on it. The society can also organize welfare measures for its members like providing easy and cheaper credit for purchasing nets and boats, supply of free nylon twine, supply of cedrus wood at subsidized rates, scholarships for children, etc. The society can even arrange for the proper marketing of fish catch at proper prices by establishing a separate and permanent fish market, a long-standing demand of the fisherfolk. Presently, the fish are sold at different places like bus termini, bridges and busy market places, resulting in unhygienic and unsanitary conditions. In the present study, some respondents suggested that a separate fish market be constructed for them. Infrastructure facilities like ice plant and cold storage centres near the market could also be provided for improvement of the marketing activities. So, the cooperative society, if established, can play an important role in uplifting the socio-economic conditions of the fishermen in the following ways: (i) liberate the indebted fishermen from the clutches of the money lenders, (ii) make marketing arrangements for the disposal of fish and fish products, (iii) arrange institutional credit for the purchase of gear and craft, (iv) disseminate the latest and appropriate fishing technology to the fishermen, (v) introduce various welfare schemes for the fishermen and (vi) integrate fishing activities with tourism.

REFERENCES

Das, S. M. and Subla, B. A., 1963. The ichthyofauna of Kashmir – History, topography, origin, ecology and general distribution. *Ichthyologica*, **1**: 68-106.

de Terra, H. and Paterson, T. T., 1939. Studies on the ice age in India and associated human culture. Carnegie Institute, Washington, 354 pp.

Dianella, G., 1922. Studies sul glaciale sped. *Ital de Fillipi Res. Sci.*, **3**: 32.

DOC, 2001. Census 2001. Directorate of Census, Jammu and Kashmir Government, Srinagar, pp. 12-56.

Enex, 1978. Study of the pollution of Dal Lake, Srinagar, Kashmir, India. A Report prepared for the Commonwealth Fund for Technical Cooperation by Enex of New Zealand Inc., pp. 1-65.

Jayaram, K. C., 1974. Ecology and distribution of fresh-water fishes, amphibia and reptiles. *In:* M. S. Mani (ed.), Ecology and Biogeography in India. Dr. W. Junk, b.v. Publishers, The Hague, pp: 517-584.

Kaul, V., 1988. The interdisciplinary approach to save the dying Dal Lake in Kashmir. *In*: Recent Advances in Fish Ecology, Limnology and Eco-conservation. Creative Publishers, New Delhi, pp. 28-35.

Kaul, V., Trisal, C. L. and Handoo, J. K., 1978. Distribution and production of macrophytes in some water bodies of Kashmir. *In*: Singh, J. S. and Gopal, B. (ed.), Glimpses of Ecology, International Scientific Publications, Jaipur, pp. 313-334.

Kaul, V. and Zutshi, D. P., 1967. A study of aquatic and marsh land of Srinagar. *Proc. Nat. Inst. Sci. India*, **33-B**: 113-123.

Kundangar, M. R. D., 1994. Impact of waste waters on the vegetational pattern of Dal Lake. *In:* National Symposium on Current Research in Plant Sciences, Department of Botany, Punjab University, Chandigarh, pp. 41-49.

Qureshi, M. Y., Singh, J. P. and Das, S. M., 1971. On the problem of depletion of endemic fishes of Kashmir by the introduction of exotic carp (*Cyprinus carpio*). *In:* All India Symposium on Ichthyology and Hydrobiology and Fisheries, pp.18-19.

Riddle, 1983. Dal Lake Development Report in Vale of Kashmir. Report submitted to the Jammu and Kashmir Government, Srinagar, pp. 1-43.

Saxena, D. B. and Koul, D. N., 1966. Fish and fisheries of Jammu and Kashmir State, Part I. Fisheries resources and problems. *Ichthyologica,* **5**: 45-52.

Shyam Sunder, 1995. Some conservation and management strategies for Dal Lake fisheries. *Punjab Fish. Bull.,* **19**: 53-63.

Shyam Sunder, Bhagat, M. J., Joshi, C. B. and Ramakrishna, K. V., 1978. Fishing methods and fish catch composition of Dal Lake, Srinagar (Jammu and Kashmir) during 1969-72. *J. Inland Fish. Soc. India*, **10**: 9-18.

Subla, B. A., 1967. Studies on the functional anatomy of the alimentary canal. Part III. On the functional anatomy of feeding apparatus and the food of some Kashmir fishes. *Kash. Sci.*, 4: 148-177.

Yousuf, A. R. and Parveen, M., 1989. Ecology of polluted waters of Kashmir, Brari Nambal basin of Dal Lake. *In:* Yousuf, A. R., Raina, M. K. and Qadiri, M. Y. (ed.), Current Trends in Fish and Fishery Biology and Aquatic Ecology, pp. 255-258.